AYK REGION
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KWINIUK RIVER SALMON ENUMERATION STUDIES, 1975

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ABSTRACT

A salmon counting tower project on the Kwiniuk River, completed its eleventh season of operation in 1975. Kwiniuk River expanded escapement enumerated past the counting tower in 1975 was 14,344, 57,317 and 44 for chum salmon (Oncoryhnchus keta), pink salmon (O.gorbuscha), and king salmon (O.tschawytscha) respectively. Chum salmon escapement to the Kwiniuk River was the lowest since 1965 when this project was initiated. Chum and pink salmon arrival to the Kwiniuk River was the latest documented since 1965.

An aerial survey was conducted of the Tubutulik River in conjunction with counting tower operations on the Kwiniuk River. Subsistence and commercial catch sampling was also conducted to collect age, sex, and size information of the chum salmon.

INTRODUCTION

A salmon counting tower project was initiated in 1965 on the Kwiniuk River, 110 miles east of Nome (Figure 1). The Kwiniuk River, similar to other major rivers in Norton Sound, received moderate runs of chums and pink salmon which are harvested by subsistence and commercial fishermen. To effectively manage the Norton Sound fisheries, it is important that frequent estimates of escapements during the season be obtained by either aerial survey counts or tower counts. Tower counts are more accurate a method and provide a check on aerial surveys conducted.

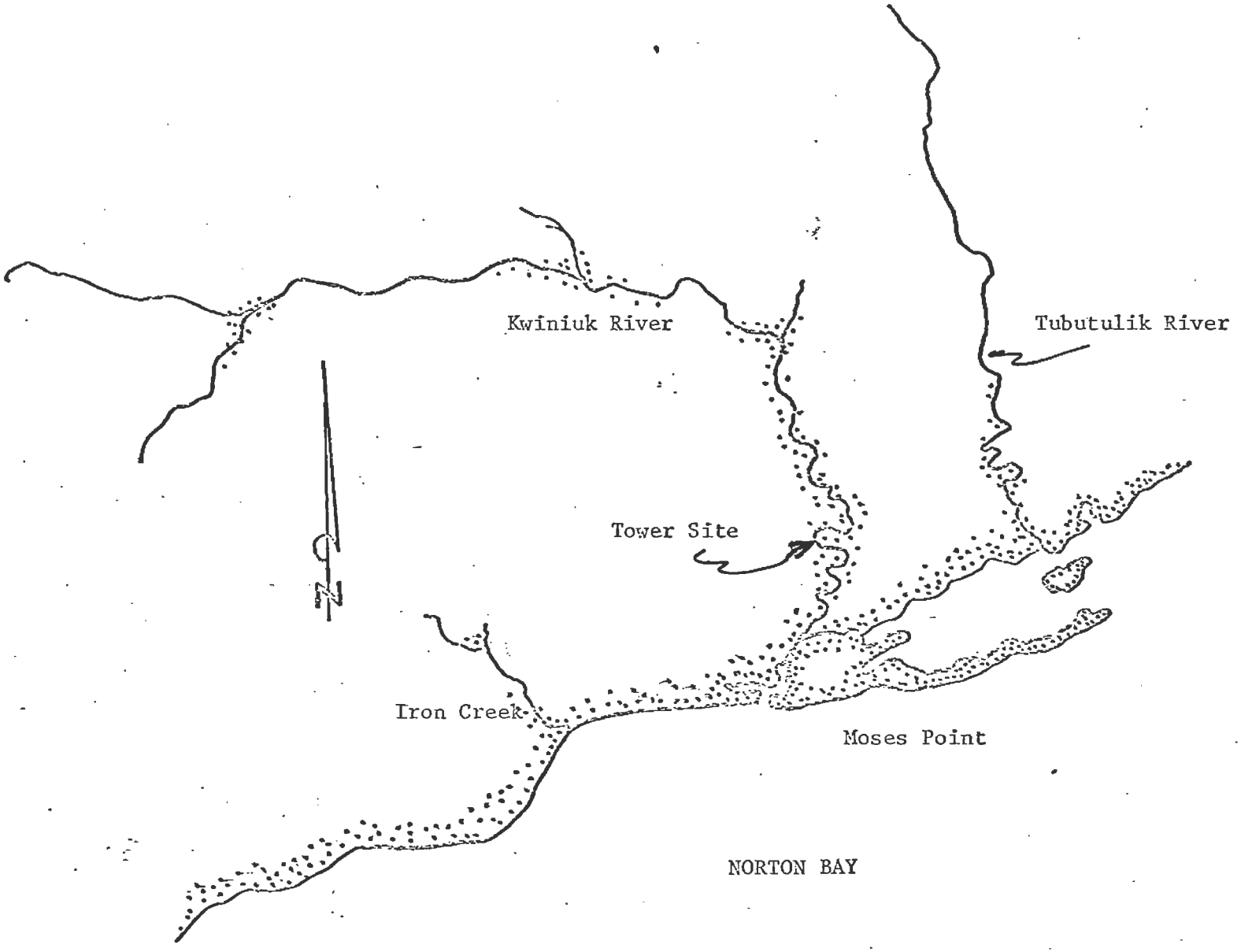

Figure 1. Salmon Counting Tower Location, Kwiniuk River, 1975.

OBJECTIVES

The 1975 project objectives were to:

1. Obtain daily and seasonal timing and magnitude of salmon escapements.

2. Periodically sample the Moses Point commercial salmon catch and the Kwiniuk River escapement for age, sex and size composition.

3. Determine feasibility of assessing age composition of king salmon escapements by visual length catagorization.

METHODS AND MATERIALS

A portable 20-foot aluminum counting tower was erected on the bank of the Kwiniuk River approximately 5 river miles upstream from the river's mouth (Figure 2). The 1975 tower site was a new location, approximately 200 yards downstream from the previous site location.

A 50-foot weir of 1 inch chicken wire was constructed as a deflection weir to divert the upstream migration of salmon towards the counting tower. The weir was supported by 7 foot fence stakes placed into the substrate every 3 feet.

A 50 by 6 foot white canvas panel was placed on the river substrate held in place by 1/4 inch wire rope and sandbags. The background panel was placed across the river immediately adjacent to the counting tower to enhance counting visibility.

Facsimiles of king salmon were painted on the background panel in respective lengths of 50, 60 and 80 centimeters to provide an immediate reference in estimating the length of migrating king salmon.

A power line with three 400-watt light bulbs housed in 18 inch diameter reflectors was strung across the main channel to provide illumination during periods of darkenss and overcast. A 1,250 watt generator provided electrical current for the lights.

A three man crew began 18 hour counting operations on June 19 and terminated counting operations on July 26. Each crew member counted salmon for two, 3-hour shifts daily from 1200 hours until 0600 hours the following day. Hourly counts were totaled and salmon

moving downstream were subtracted from the total.

Ten-minute counts were made at the beginning of each counting hour to determine if 10-minute counts could be used as a basis for estimating hourly migration. Ten-minute counts were expanded by a factor of six to obtain an estimate of hourly migration.

At times it was impossible to make counts of salmon escapement due to inclement weather and turbid water conditions. These missing counts were expanded by averaging the last complete hourly/daily count with the next complete hourly/daily count.

Salmon catches were periodically sampled for age, sex, and size information at the buying station near the river mouth. Salmon escapement was sampled using fish caught by beach seine upstream of the counting tower.

Based upon research data from 1965 to 1969, the average chum and pink salmon escapement during the non-counted hours from 0600 until 1200 hours was 2.1 and 3.66 percent of the total run respectively. Eighteen hour counts were expanded by these percentages to estimate total salmon escapement.

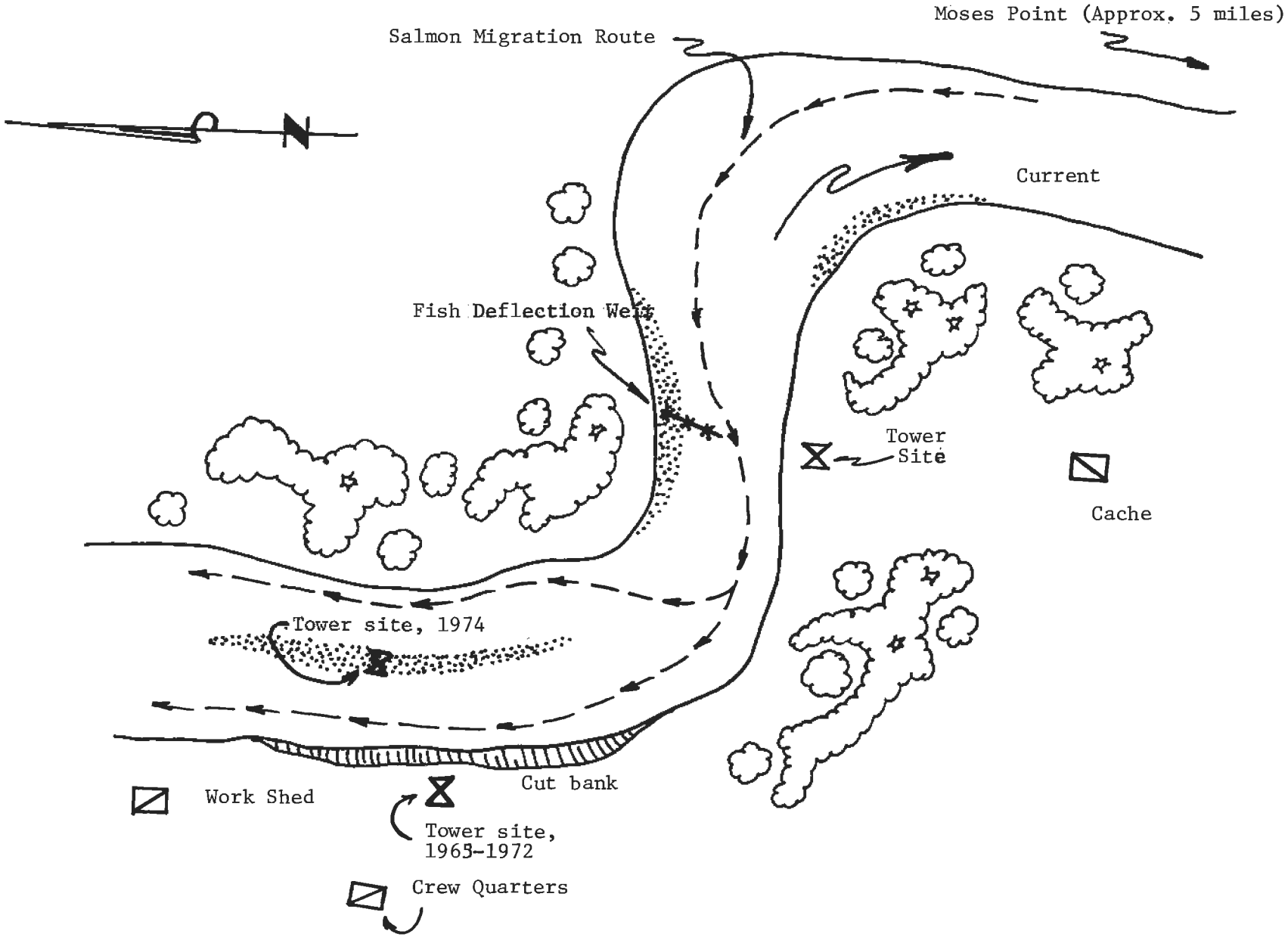

Figure 2. Kwiniuk River salmon counting tower site, 1975.

RESULTS

In 1975 a total of 44 king, 14,049 chum and 55,293 pink salmon was counted past the tower (Table 1). Peak of the chum salmon run occurred during the period, July 14-July 21 with the first chum salmon counted passing the tower on July 4. Peak of the pink salmon run occurred during the period, July 17-July 25 with the first pink observed passing the tower on July 6 (Figure 3). Daily chum salmon migration was heaviest during the hours from 2100 to 0211 hours, with pink salmon migration heaviest during hours from 2300 to 0100 hours (Figure 4).

Ten minute counts resulted in an expanded estimate of 14,514 chum and 51,774 pink salmon (Table 2).

A total of 344 chum salmon was sampled for age, sex and length data from the Moses Point subdistrict commercial fishery (Table 3). Weighted, age composition of this sample was 0.2%, age 3_1, 89.8%, age 4_1, and 10.0%, age 5_1. Male to female ratio of this sample was 1.09:1.00. Fifty-six chum salmon were sampled from the Kwiniuk River escapement (Table 4). Age composition of this sample was 3.6%, age 3_1, 69.6%,age 4_1 and 26.8%, age 5_1, with a male to female ratio of 0.47:1.00. The escapement sample of 56 chum salmon was obtained during the latter part of the project period and coupled with the small sample size may be non-representative of the age and sex composition of the total escapement. The 44 king salmon passing the counting tower in 1975 were estimated to length as follows: 0(less than 50c.m.); 4 (50 to 60 c.m.); 33 (60 to 80c.m.) and 7 (greater than 80 c.m.) Table 5.

An aerial survey conducted of the Tubutulik River via chartered

Table .. Daily/hourly salmon migration past Kwiniuk k.. . salmon counting tower, 1975. Species:Pink

Hour	0	1	2	3	4	5	12	13	14	15	16	17	18	19	20	21	22	23	Daily Total
Date																			
7/6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	36	79
7/7	40	24	-6	2	1	7	2	1	3	1	-1	-	-	1	10	4	-	8	106
7/8	1	-	26	-1	-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-9
7/9	44	8	13	2	-	3	-	-	-	-	-	-	-	-	3	2	18	12	118
7/10	32	31	11	11	8	8	-	-	-	-	4	14	18	27	27	29	26	42	290
7/11	26	25	6	9	-	-	-	-	-	-	-	-	-	66	22	24	21	34	236
7/12	15	15	2	5	4	5	-	-	-	-	-	7	9	13	13	14	13	20	139
7/13	5	4	-	-	-	-	-	-	-	-	-	-	3	4	9	12	-	3	42
7/14	-	-	17	-	-	-	-	-	-	-	-	-	11	1	-	-	-	-	12
7/15	-	4	24	3	6	19	-	-	4	17	6	24	19	52	27	22	35	36	291
7/16	40	68	37	5	4	-	-	-	-	-	35	7	-	1	13	114	63	92	466
7/17	91	170	87	57	7	2	-	3	13	22	78	14	7	27	61	65	73	32	759
7/18	58	225	131	86	87	68	-	-	-	-	19	45	68	88	300	662	511	350	2654
7/19	530	327	721	225	114	29	-	2	1	14	62	185	377	770	799	388	590	1045	5589
7/20	570	1001	1644	587	509	110	-	-	226	64	147	957	1073	1190	874	845	781	1927	11582
7/21	1745	742	774	623	446	144	1	3	154	90	232	769	983	1486	1415	1592	1448	2294	15866
7/22	797	106	244	325	204	659	-	1	70	41	-	38	449	679	663	730	662	1048	7246
7/23	598	581	21	214	153	99	-	-	-	31	79	264	337	509	497	547	496	787	5436
7/24	800	409	84	27	3	-	-	-	-	18	4	15	6	152	114	235	115	114	2033
7/25	584	476	27	17	1	-	-	-	7	13	26	13	24	101	163	231	88	95	1923
7/26	63	75	-	17	6	-	-	-	-	1	7	7	33	63	15	48	65	8	435
Hourly Totals	6039	4291	3916	2214	1550	1153	3	10	478	312	698	2359	3417	5288	5025	5569	5048	7983	55,293
% of Total Run	10.8	7.8	7.1	4.0	2.8	2.1	0.0	0.0	0.8	0.6	1.3	4.3	6.2	9.5	9.1	10.1	9.1	14.4	

Table 1. Daily/hourly salmon migration past Kwiniuk River salmon counting tower, 1975 Species: Chum (continued)

Hour	0	1	2	3	4	5	12	13	14	15	16	17	18	19	20	21	22	23	Daily Total
Date																			
7/4	-	-	-	-	-	-	-	25	-	-	-	-	7	4	2	1	-	33	72
7/5	-	-	-	-	-	-	-	-	-	10	-	-	25	67	2	4	35	148	291
7/6	-	44	-	-	-	-	50	79	40	10	-12	-32	38	-19	106	1	27	33	365
7/7	69	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-2	-	-	107
7/8	4	-5	-	-	-	-	-	-	-	-	-	-	-	-	46	19	43	43	150
7/9	17	21	11	9	2	-	-	-	1	7	-	8	14	7	13	15	11	15	151
7/10	131	47	-	-	-	-	-	-	-	-	-	-	-	-	56	23	22	31	310
7/11	75	35	46	39	24	11	3	6	5	11	37	37	16	-	35	20	17	24	441
7/12	19	23	12	10	6	3	-	1	2	1	3	10	4	6	14	17	12	16	159
7/13	38	44	23	20	12	5	1	3	3	5	19	8	9	2	28	33	23	32	308
7/14	71	114	21	31	12	4	-	-	4	25	43	28	47	63	69	253	96	195	1076
7/15	104	183	89	9	10	3	-	-	-	4	205	57	7	3	78	505	205	259	1721
7/16	385	604	73	163	28	-	-	10	32	75	293	15	3	13	130	170	142	108	2244
7/17	177	370	125	145	166	163	-	-	-	-	39	92	86	92	337	98	125	87	2102
7/18	264	179	67	46	22	3	-	1	3	2	19	15	38	79	53	22	42	91	946
7/19	75	78	217	250	129	16	-	-	10	10	15	106	132	111	66	57	58	146	1476
7/20	130	28	18	34	53	4	-	-	4	62	77	-	20	130	96	50	38	13	757
7/21	88	104	54	27	41	12	-	-	-	5	27	101	23	49	34	65	54	75	759
7/22	32	38	20	17	5	-	-	-	-	-	16	7	5	134	24	28	20	28	374
7/23	10	26	10	3	17	3	-	-	1	3	9	4	5	7	13	16	11	15	153
7/24	8	5	4	18	1	-	-	-	1	-	-	2	1	4	9	7	8	3	71
7/25	3	6	-	-	1	-	-	-	-	-	-	-	-	-	1	-	5	-	16
7/26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Hourly Total	1700	1984	790	821	529	227	54	125	106	230	790	458	480	752	1212	1402	994	1395	14,049
% of Total Run	12.1	14.1	5.6	5.8	3.8	1.6	1.6	0.9	0.8	1.6	5.6	3.3	3.4	5.4	8.6	10.0	7.1	9.9	

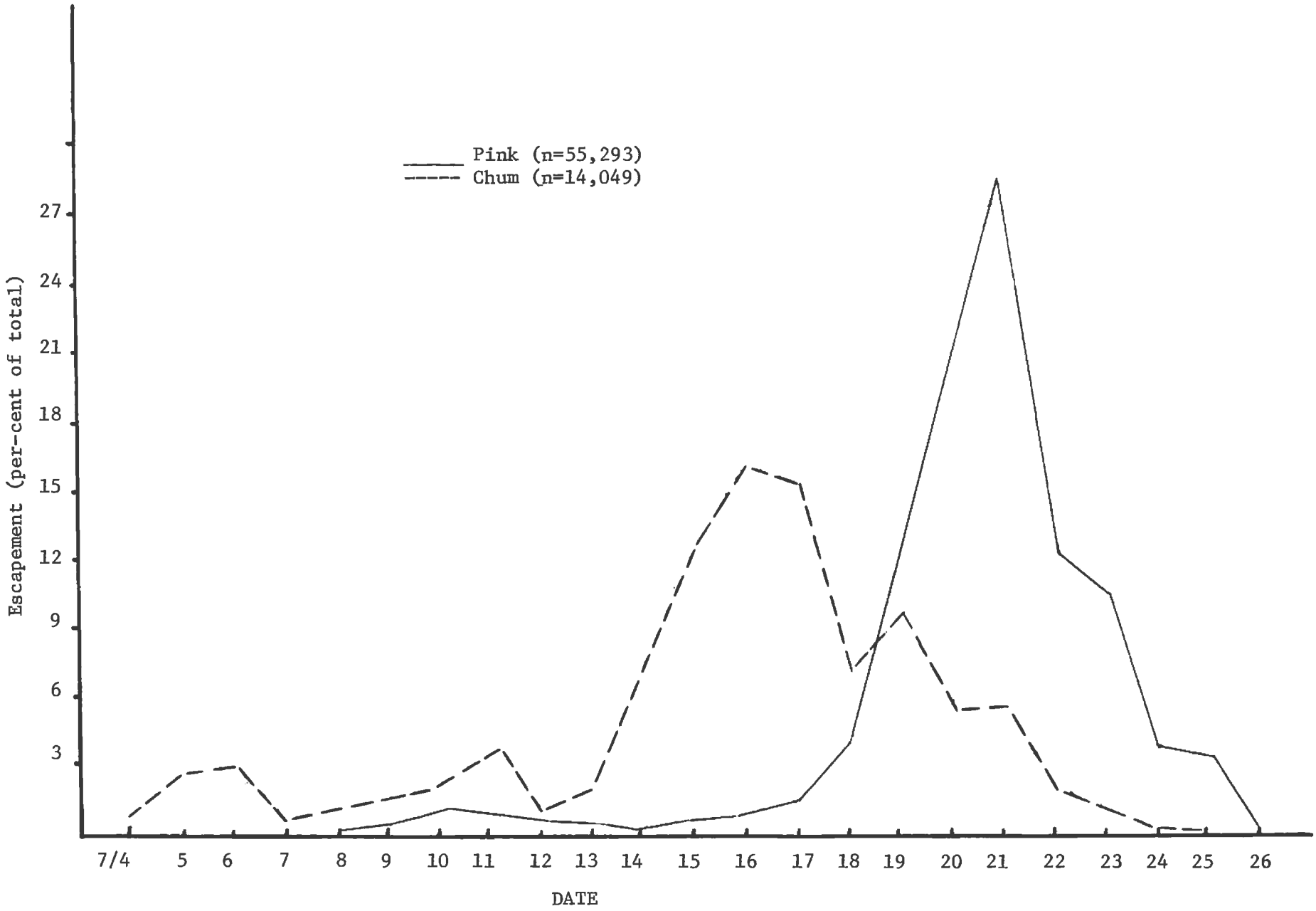

Figure 3. Daily salmon escapement past Kwiniuk River salmon counting tower, 1975.

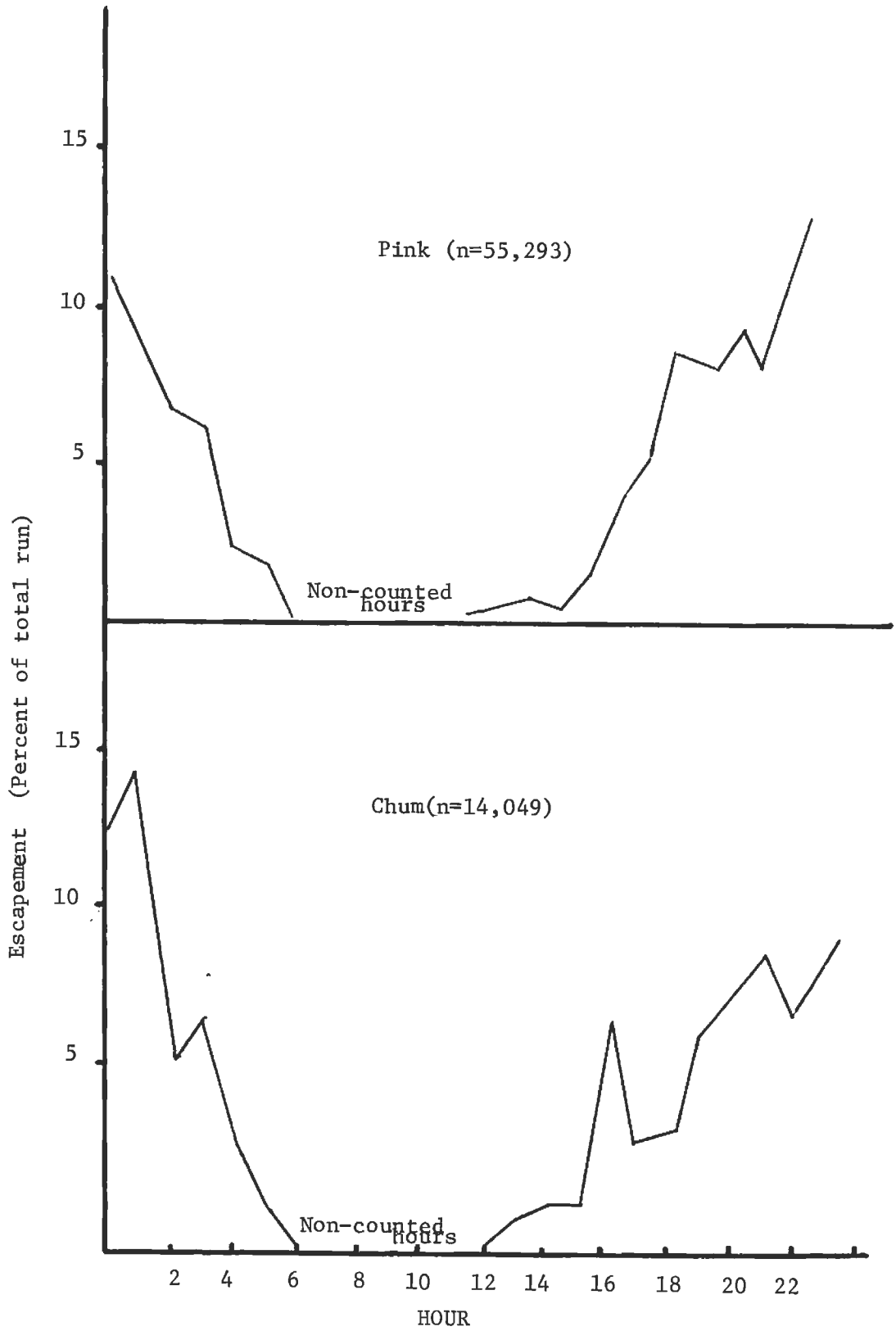

Figure 4. Hourly migration of chum and pink salmon enumerated past the Kwiniuk River salmon counting tower, 1975.

Table 2. Estimates of Daily Salmon Migration Past Kwiniuk River Tower, using expanded 10 minute counts, Kwiniuk River, 1975.

	Chum Salmon			Pink Salmon		
Date	10-minute Counts	Expanded 10-minute Counts	Actual Counts	10-minute Counts	Expanded 10-minute Counts	Actual counts
7/4	28	168	72	0	0	0
7/5	67	402	291	0	0	0
7/6	96	576	365	2	12	79
7/7	5	30	107	22	132	106
7/8	18	108	150	2	12	-9
7/9	82	492	151	0	0	118
7/10	48	288	310	40	240	290
7/11	31	186	441	27	162	236
7/12	14	84	159	13	78	139
7/13	3	18	308	9	54	42
7/14	198	1188	1076	4	24	12
7/15	272	1632	1721	100	600	291
7/16	380	2280	2244	81	486	466
7/17	326	1956	2102	124	744	759
7/18	180	1080	946	453	2718	2654
7/19	331	1986	1476	649	3894	5589
7/20	144	864	757	2103	12618	11582
7/21	81	486	759	1661	9966	15866
7/22	50	300	374	1219	7314	7246
7/23	18	108	153	777	4662	5436
7/24	31	186	71	335	2010	2033
7/25	16	96	16	377	2262	1923
7/26	0	0	0	631	3786	435
TOTALS	2,419	14,514	14,049	8,629	51,774	55,293

Table 3 Age, Sex and Size Composition of Norton Sound District (333) Chum Salmon, Commercial Catch Sample Taken at Moses Point, (333-30), 1975.[1/]

Dates of Samples	Combined Sex	Age Classes No.	Age Classes %	Age 3 No.	Age 3 %	Age 3 Length	Age 4 No.	Age 4 %	Age 4 Length	Age 5 No.	Age 5 %	Age 5 Length
7/3	Males	27	46.6				19	32.8	(609.9)	8	13.8	(644.8)
	Females	31	53.4	-	-	-	26	44.8	(593.5)	5	8.6	(619.6)
	Subtotal	58	100.0				45	77.6	(600.4)	13	22.4	(635.1)
7/5	Males	23	40.3				17	29.8	(591.7)	6	10.5	(623.7)
	Females	34	59.7	-	-	-	31	54.4	(574.4)	3	5.3	(590.0)
	Subtotal	57	100.0				48	84.2	(580.5)	9	15.8	(612.5)
7/9	Males	30	54.5				23	41.8	(585.9)	7	12.7	(620.9)
	Females	25	45.5	-	-	-	23	41.8	(564.0)	2	3.7	(590.0)
	Subtotal	55	100.0				46	83.6	(575.0)	9	16.4	(614.0)
7/12	Males	35	62.5				32	57.1	(596.7)	3	5.4	(609.3)
	Females	21	37.5	-	-	-	21	37.5	(560.8)			
	Subtotal	56	100.0				53	94.6	(582.5)	3	5.4	(609.3)
7/15	Males	24	40.7	1	1.7	(512.0)	21	35.6	(580.9)	2	3.4	(614.0)
	Females	35	59.3				31	52.5	(572.6)	4	6.8	(591.0)
	Subtotal	59	100.0	1	1.7	(512.0)	52	88.1	(576.0)	6	10.2	(598.7)
7/16	Males	30	50.8				26	44.0	(595.5)	4	6.8	(606.5)
	Females	29	49.2	-			28	47.5	(563.4)	1	1.7	(596.0)
	Subtotal	59	100.0				54	91.5	(578.9)	5	8.5	(604.4)
TOTALS	Males	169	49.1	1	0.3	(512.0)	138	40.1	(593.5)	30	8.7	(624.3)
	Females	175	50.9				160	46.5	(572.0)	15	4.4	(600.5)
GRAND	TOTAL	344	100.0	1	0.3	(512.0)	298	86.6	(582.0)	45	13.1	(616.4)
Weighted[3/] Percentages	Males		52.3		0.2			45.1			7.0	
	Females		47.7					44.7			3.0	
	TOTALS		100.0		0.2			89.8			10.0	

1/ Type of gear: 5 1/2" - 5 7/8" mesh gill net.
2/ Type of measurement: mid-eye to fork of tail.
3/ Weighted by commercial catch.

Table 4 Age, Sex and Size Composition of Norton Sound District (333) Chum Salmon, Escapement Sample, Taken at Kwiniuk River (333-30), 1975.[1/]

Dates of Samples	Combined Age Classes Sex	No.	%	Age 3, No.	%	Length	Age 4, No.	%	Length	Age 5, No.	%	Length
7/22	Males	8	36.4	1	4.5	(527.0)	4	18.2	(570.0)	3	13.7	(640.0
	Females	14	63.6				7	31.8	(562.7)	7	31.8	(598.3
	Subtotal	22	100.0	1	4.5	(527.0)	11	50.0	(565.5)	10	45.5	(610.8)
7/23	Males	4	44.4				4	44.4	(557.1)			
	Females	5	55.6				4	44.4	(540.0)	1	11.2	(599.0
	Subtotal	9	100.0				4	88.8	(548.5)	1	11.2	(599.0
7/24	Males	6	24.0				4	16.0	(583.8)	2	8.0	(605.0
	Females	19	76.0	1	4.0	(514.0)	16	64.0	(549.8)	2	8.0	(574.0
	Subtotal	25	100.0	1	4.0	(514.0)	20	80.0	(556.6)	4	16.0	(589.5
TOTALS	Males	18	32.1	1	1.8	(527.0)	12	21.4	(570.3)	5	8.9	(626.0
	Females	38	67.9	1	1.8	(514.0)	27	48.2	(551.7)	10	17.9	(593.5
GRAND	TOTAL	56	100.0	1	3.6	(520.5)	39	69.6	(557.4)	15	26.8	(604.3

1/ Type of gear: 1 3/4" mesh beach seine.
2/ Type of measurement: mid-eye to fork of tail.

Table 5 . Daily king salmon migration enumerated by length category past the Kwiniuk River counting tower, 1975.

Date	Total #	Estimated Length			
		50(cm)	50-60(cm)	60-80(cm)	80(cm)
7/15	3	--	--	2	1
7/16	14	--	2	10	2
7/17	3	--	--	3	--
7/18	7	--	1	4	2
7/19	4	--	--	4	--
7/20	8	--	1	7	--
7/21	1	--	--	--	1
7/22	0	--	--	--	--
7/23	3	--	--	2	1
7/24	1	--	--	1	--
TOTALS	44	--	4	33	7

DISCUSSION

Based upon research data from 1965 to 1969, the average chum salmon escapement during the six hours from 0600 until 1200 hours was 2.1 percent of the total run. Average pink salmon escapement during these hours was 3.66 percent. Using these figures, the expanded 1975 chum and pink salmon escapement was 14,344 and 57,317 respectively (Appendix Table 1).

The expanded 1975 chum salmon escapement was the lowest recorded since the tower project was initiated in 1965 and was approximately 56% below the previous 10-year average of 32,425. Expanded pink salmon escapement of 57,317 was slightly below the previous 10-year average of 62,059 and 1.3 times 1974 brood year escapement. The 1975 king salmon escapement of 44, although not a record, is a continuance of the trend indicating an increasing population.

Daily Kwiniuk River water temperatures, presented in Table 7, indicate a seasonal warming of waters occurring from June 17 to July 8. A period of storms, heavy rainfall and overcast occurring on July 6, 7 and 8 resulted in colder water temperatures. Seasonal warming of river water did not stabilize in rate until July 16-18. Accelerated rates of chum and pink salmon upstream migrations appear to have been triggered at this time by this later warming trend.

Cessna 180 on July 31 yielded an estimated count of 7 king, 15,871 chum and 38,003 pink salmon.

In 1975, commercial fishermen of the Moses Point subdistrict harvested 16 king; 3,901 pink and 44,071 chum salmon (Table 6). Commercial fishing activity was conducted from July 1, when the first salmon (chum) were caught and extended to July 16. The subsistence harvest for this subdistrict was an estimated 2 king, 1,280 pink and 508 chum salmon.

Table 6. Commercial salmon catches from Moses Point (Subdistrict 30) Norton Sound District
Set Gill nets, 1975.

Date of landing	Hours fished	No. Boats	Total catch (Catch/boat hour) King	Coho	Pink	Chum	Cumulative Catch King	Coho	Pink	Chum
6/30	6									
7/1	24	12				228				228
7/2	18	29	2		7	1345	2		7	1573
	48	31	2(+)		7(+)	1573 (1.1)				
7/3	6	3				64				1637
7/4	24	41	1		27	4187	3		34	5824
7/5	18	43	1		267	4656	4		301	10480
	48	51	2(+)		294(0.1)	8907(3.6)				
7/7	6	4			2	161			303	10641
7/8	24	27	3		236	4293	7		539	14934
7/9	18	34	4		222	5212	11		761	20146
	48	40	7(+)		460(0.2)	9666(5.0)				
7/10	6	25	1		220	1995	12		981	22141
7/11	24	45	1		583	8670	13		1564	30811
7/12	18	41			266	5142			1830	35953
	48	50	2(+)		1069(0.4)	15807(6.6)				
7/14	6	4			9	279			1839	36232
7/15	24	32	3		1061	5122	16		2900	41354
7/16	18	33			1001	2717			3901	44071
	48	39	3(+)		2071(1.1)	8118(4.3)				
TOTALS	240	67	16(+)	0	3901(0.2)	44071(2.7)	16	0	3901	44071

Table 7. Water temperature, by date, of Kwiniuk River, Kwiniuk River Counting tower, 1975.

Date	Water Temp.(°F)	Date	Water temp.(°F)
June 17	52	July 10	48
18	52	11	48
19	54	12	53
20	52	13	54
21	48	14	55
22	46	15	52
23	46	16	54
24	46	17	55
25	45	18	56
26	49	19	57
27	52	20	58
28	51	21	58
29	49	22	59
30	48	23	59
July 1	--	24	60
2	--	25	60
3	57	26	60
4	58	27	57
5	58	28	53
6	58	29	49
7	54	30	48
8	52		
9	48		

The latest recorded arrival of both chum and pink salmon since 1965 may be attributed in part to unusually cold river waters experienced during mid-July. Schooling or milling of salmon off shore may have occurred at this time thus enhancing catchability of salmon in the commercial fishery. This milling or schooling phenomenon and the fact that commercial fishermen almost exclusively target chum salmon, using large mesh gill nets, may have resulted in excessive numbers of chum salmon being caught. This may, in part, explain poor chum and conversly excellent pink salmon escapement to the Kwiniuk River in 1975. In mid-July it was noted that escapement rates were seasonally lagging and the commercial chum salmon harvest rate was exceptionally high. An emergency order, issued July 16, closed Moses Point and all subdistricts of Norton Sound to commercial salmon fishing. During this closure, river water temperatures began warming and salmon escapement rate and numbers improved. By inspection of Figure 5, it appears the purpose of the commercial closure was too late for enhancing chum salmon escapement to the Kwiniuk River. An emergency order issued July 20, reopened Norton Sound to commercial salmon fishing. It should be noted that commercial salmon buying stations at Moses Point, terminated operation on July 18.

In 1975, 10-minute tower counts made at the beginning of each counting hour were expanded to obtain daily estimates of the salmon run. Percent error between the expanded 10-minute counts and actual

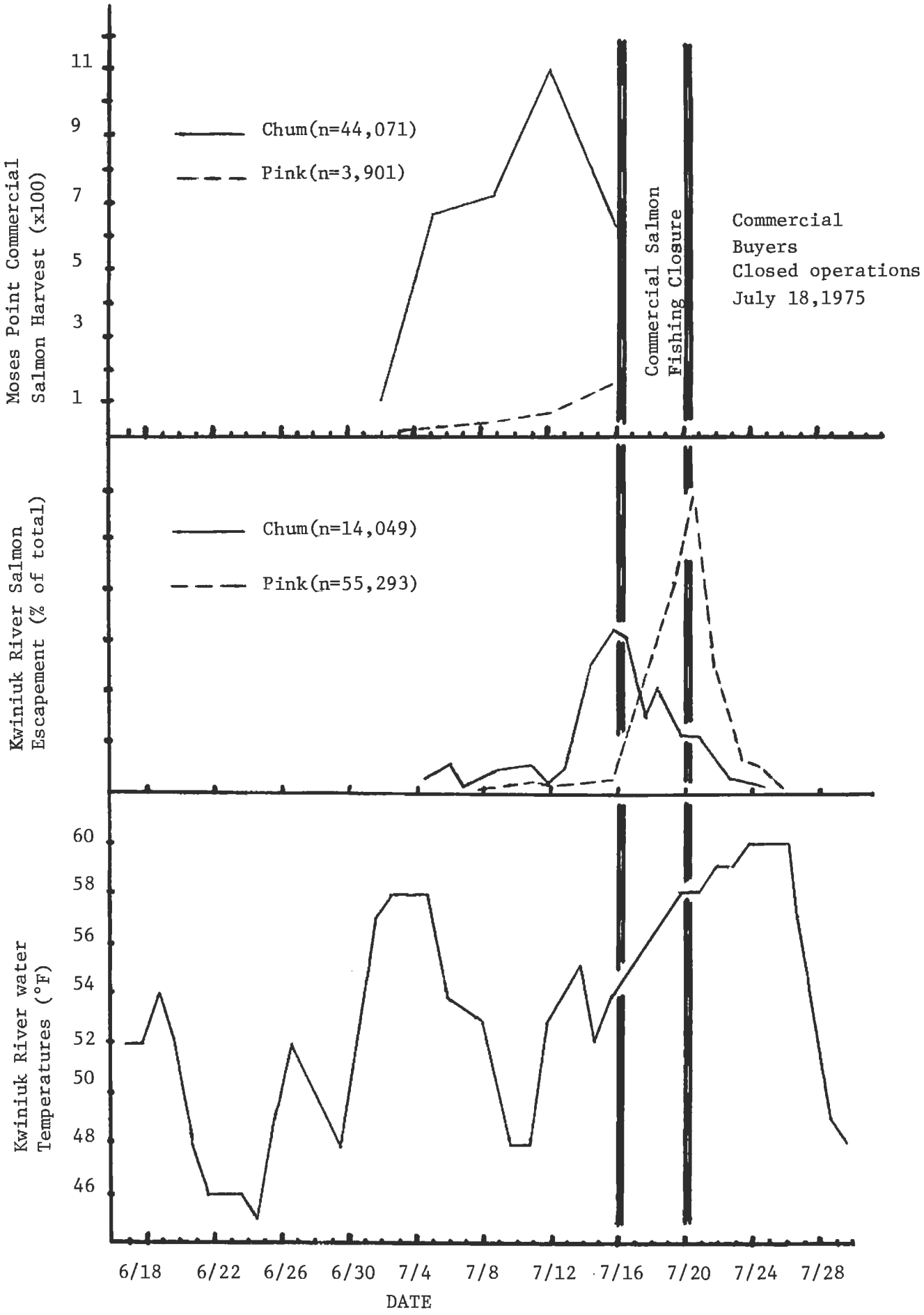

Figure 5. Kwiniuk River water temperatures, salmon escapement and Moses Point commercial salmon harvest, by day, showing commercial salmon fishing closure, 1975.

counts is computed as follows:

Species	Expanded 10-minute count	Actual Count	Actual count less expanded	Relative error
Chum	14,514	14,049	-465	$-465 \div 14{,}049 \times 100 = -3.31\%$
Pink	51,774	55,293	+3,519	$+3{,}519 \div 55{,}293 \times 100 = +6.36\%$

Relative error of +3.31% and -6.26% for chum and pink salmon respectively, indicate that 10-minute counts could be used to determine salmon escapement past the Kwiniuk River counting tower.

Appendix Table 1. Daily total cumulative salmon escapements, Kwiniuk River, 1965-1975.

Species	Date	YEAR 1965	1966	1967	1968	1969
Chum	6/18	6				
	6/19		24			
	6/20		50			
	6/21		158			
	6/22		506			
	6/23		759			
	6/24		1,048	5		
	6/25		597	24	66	
	6/26		1.060	77	231	57
	6/27	218	1,189	270	1,066	113
	6/28	983	1,697	315	1,812	427
	6/29	2,576	1,768	1,455	2,838	571
	6/30	3,445	2,180	2,148	3,509	1,475
	7/1	7,741	5,728	2,739	4,443	2,057
	7/2	8,794	7,619	3,027	5,971	2,744
	7/3	9,988	8,054	3,491	6,914	3,861
	7/4	11,050	10,050	5,647	8,427	6,056
	7/5	12,078	11,958	6,157	9,409	7,137
	7/6	12,602	13,184	9,605	10,247	8,107
	7/7	13,445	13,703	13,088	12,428	9,514
	7/8	13,824	15,703	15,691	15,033	10,568
	7/9	15,630	17,703	18,513	16,720	11,727
	7/10	19,147	17,472	21,487	18,003	12,197
	7/11	22,818	19,551	23,459	18,284	12,577
	7/12	23,491	24,549	26,165	18,349	13,200
	7/13	26,444	27,225	26,473	18,415	14,198
	7/14	32,026	27,579	26,459	18,431	14,879
	7/15	32,190	28,604	26,532	18,564	16,057
	7/16	32,437	28,336	26,584	18,590	16,364
	7/17	32,503	28,884	26,598	18,601	17,117
	7/18	32,861	29,965	26,625	18,636	18,345
	7/19		31,584	26,631	18,760	18,707
	7/20		32,154	26,681	18,815	18,918
	7/21		32,398	26,661	18,847	19,233
	7/22		32,723		18,907	19,373
	7/23		32,938		18,951	19,390
	7/24		33,030		19,976	19,525
	7/25		33,137			19,554
	7/26		33,153			19,749
	7/27		33,153			
	7/28		33,184			
	7/29		33,182			
		-6,227[2] / 26,634	-396[2] / 32,786	-2,217[2] / 24,444	-163[2] / 18,813	-62[2] / 19,687

1/ 1970 was the first year of 18 hour counts, 12 noon until 6 a.m. the next day. The average escapement for the hours from 6 a.m. until 12 noon for the years 1965-1969 was 2.1 percent of the total escapement for chums and 3.66 percent for pink salmon.

2/ Subsistence catch.

Appendix Table 1. (continued) Daily total cumulative salmon escapements, Kwiniuk River, 1965-1975.

Species	Date	1970	1971	1972	1973	1974	1975
Chum	6/18						
	6/19					16	
	6/20					79	
	6/21					80	
	6/22					202	
	6/23					479	
	6/24					950	
	6/25	2			11	1,113	
	6/26	17	23		13	3,316	
	6/27		51		17	5,047	
	6/28		95	33	17	6,942	
	6/29	645	139	51	17	8,358	
	6/30	2,302	196	158	26	9,805	
	7/1	3,327	452	697	97	11,266	
	7/2	6,420	728	1,375	207	13,776	
	7/3	14,467	1,181	1,607	402	15,674	
	7/4	20,873	3,362	2,793	1,514	16,985	72
	7/5	26,699	4,783	4,143	4,545	17,972	363
	7/6	30,596	6,178	5,314	4,933	19,061	728
	7/7	31,468	6,651	9,277	5,075	19,479	835
	7/8	34,695	10,677	12,100	8,495	19,766	985
	7/9	40,012	11,539	14,384	8,870	20,126	1,136
	7/10	40,362	13,401	16,242	15,022	20,347	1,446
	7/11	44,180	16,902	17,537	15,337	21,633	1,887
	7/12	47,305	18,694	21,735	16,303	22,745	2,046
	7/13	47,738	19,346	22,997	16,776	23,682	2,354
	7/14	50,304	20,566	24,998	18,944	25,084	3,430
	7/15	56,948	20,858	25,589	19,666	31,243	5,151
	7/16	60,275	21,909	25,805	20,138	32,179	7,395
	7/17	62,577	26,955	26,133	22,396	32,570	9,497
	7/18	63,065	27,836	27,284	24,075	33,388	10,443
	7/19	63,624	30,680	27,993	26,227	33,891	11,919
	7/20	65,673	33,800	28,371	26,995	34,084	12,676
	7/21	65,717	34,473	28,502	27,304	34,209	13,435
	7/22	66,062	35,237	29,020	27,341	34,294	13,809
	7/23	66,176	35,510	29,458	27,570	34,676	13,962
	7/24	66,336	36,185	29,756	28,008	34,979	14,033
	7/25	66,545	36,959	29,995	28,029	35,130	14,049
	7/26	66,584	37,680	30,055		35,161	
	7/27	66,599	38,107				
	7/28	66,602	38,186				
	7/29	66,604	38,243				
		x 2.1%[1]	x 2.1%[1]	x 2.1%[1]	x 2.1%[1]	x2.1%[1]	x2.1%[1]
		1,400	803	631	588	738	295
		+66,604	+38,243	+30,055	+28,029	+35,161	14,049
		68,004	39,046	30,686	28,617	35,899	14,344
			- 367[2]				
			38,679				

Appendix Table 1. (continued) Daily total cumulative salmon escapement, Kwiniuk River, 1965-1975.

Species	Date	YEAR 1965	1966	1967	1968	1969
Pink	6/18					
	6/19					
	6/20					
	6/21					
	6/22					
	6/23					
	6/24					
	6/25					
	6/26					17
	6/27					19
	6/28	174			48	41
	6/29	260			214	52
	6/30	220			534	117
	7/1	276		1	755	131
	7/2	314	11	3	1,330	232
	7/3	349	29	4	1,732	378
	7/4	396	317	6	2,501	1,165
	7/5	388	517		3,141	2,259
	7/6	390	533		4,777	3,974
	7/7	412	568	18	13,719	6,415
	7/8	588	607	45	38,560	8,683
	7/9	650	673	521	67,509	11,406
	7/10	820	683	718	81,776	12,684
	7/11	1,120	722	1,282	105,997	13,539
	7/12	1,526	758	1,926	112,984	15,447
	7/13	1,653	817	2,685	113,323	18,250
	7/14	2,856	898	3,138	113,247	19,379
	7/15	4,488	1,205	3,160	114,504	25,056
	7/16	7,301	1,008	3,320	115,018	27,850
	7/17	7,456	1,206	3,348	117,172	34,863
	7/18	7,571	1,771	3,380	121,392	37,840
	7/19	8,668	3,269	3,406	124,510	43,897
	7/20		3,894	3,432	125,848	47,626
	7/21		4,190	3,567	127,088	51,943
	7/22		5,558	3,587	128,002	54,177
	7/23		6,777		128,466	54,772
	7/24		7,843		129,052	55,741
	7/25		10,015			56,217
	7/26		10,691			57,497
	7/27		10,798			
	7/28		10,864			
	7/29					
		- 367[2/]	- 235[2/]	- 79[2/]	- 2,288[2/]	- 814[2/]
		8,301	10,629	3,508	126,764	56,683

1/ 1970 was the first year of 18 hour counts, 12 noon until 6 a.m. the next day. The average escapement for the hours from 6 a.m. until 12 noon for the years 1965-1969 was 2.1 percent of the total escapement for chums and 3.66 percent for pink salmon.

2/ Subsistence catch.

Appendix Table 1. (continued) Daily total cumulative salmon escapement, Kwiniuk River, 1965-1975.

Species	Date	YEAR 1970	1971	1972	1973	1974	1975
Pink	6/18						
	6/19						
	6/20					1	
	6/21					2	
	6/22					39	
	6/23					223	
	6/24					464	
	6/25	3			322	559	
	6/26	13			831	1,513	
	6/27	16			1,053	2,456	
	6/28	17	9	15	1,276	3,455	
	6/29	47	12	48	1,413	5,590	
	6/30	198	31	513	1,575	8,506	
	7/1	298	125	1,490	1,762	10,047	
	7/2	465	182	2,780	1,854	12,512	
	7/3	1,096	241	2,899	1,938	14,668	
	7/4	4,643	552	4,210	2,190	17,674	
	7/5	10,949	819	7,564	3,491	19,180	
	7/6	20,413	1,221	10,521	3,556	21,600	79
	7/7	20,159	1,327	21,264	3,631	22,668	185
	7/8	25,359	2,343	27,662	4,795	23,385	176
	7/9	30,729	2,490	35,297	4,979	23,781	294
	7/10	31,459	3,061	39,082	7,079	24,187	584
	7/11	39,601	5,963	42,529	7,327	24,764	820
	7/12	50,921	6,462	47,520	8,539	25,604	959
	7/13	52,800	6,994	49,581	9,281	26,840	1,001
	7/14	59,521	7,418	52,553	12,512	29,336	1,013
	7/15	90,681	7,519	53,539	13,393	33,294	1,304
	7/16	127,335	7,732	53,923	14,569	34,160	1,770
	7/17	148,750	9,646	54,483	18,347	34,502	2,529
	7/18	155,935	10,401	55,674	21,214	35,690	5,183
	7/19	161,963	12,470	57,721	27,748	36,513	10,772
	7/20	179,160	13,938	57,698	30,789	36,920	22,354
	7/21	185,247	14,571	57,997	32,842	37,086	38,220
	7/22	198,958	15,123	59,024	33,249	37,298	45,466
	7/23	208,403	15,309	59,576	35,112	38,101	50,902
	7/24	214,233	15,485	59,892	36,956	38,668	52,935
	7/25	222,209	15,658	60,147	37,070	39,263	54,858
	7/26	225,546	15,818	60,246		39,375	55,293
	7/27	226,712	15,996	60,256			
	7/28	226,829	16,089				
	7/29	226,831	16,151				
		x 3.66 %[1]	x 3.66%[1]	x 3.66% [1]	x 3.66% [1]	x 3,66% [1]	x 3.66%[1]
		8,300	591	2,205	1,356	1,441	2,024
		+226,831	+16,151	+60,256	+ 37070	+ 39,375	55,293
		235,131	16,742	62,461	38,426	40,816	57,317
			- 108[2]				
			16,634				